

Remarks

Applicants request reconsideration of the application in view of the amendments and the following remarks. By this amendment, claims 1, 6 and 29 are amended and new claims 49-54 are added. After entry of this amendment, claims 1-29 and 49-54 will be pending.

I. Claim 13 Not Rejected

Claim 13 was not rejected in the Office action. Applicants therefore presume that claim 13 is in condition for allowance.

II. Rejection of Claims 1, 3, 17, 18, 22 and 27 Over Tada

Claims 1, 3, 17, 18, 22 and 27 are rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by U.S. Patent No. 5,935,454 to Tada *et al.* (Tada). Applicants traverse this rejection and request that it be withdrawn.

Claim 1 recites a composite comprising a substrate, a pillar formed *on* the substrate, the pillar further comprising a catalyst, and a nanoscale structure formed on the pillar. Tada does not teach or suggest all of the elements of claim 1. Claim 1 requires the presence of both a substrate and a pillar formed on the substrate. Hence, the substrate and the pillar are two separate structures in claim 1.

In contrast, Tada teaches forming pillars *from* the substrate, not pillars formed *on* the substrate. Tada dry etches pillars from the substrate material itself. See Tada Fig 1(c) and column 2, lines 54-64. As a result, the substrate and the pillars are integrated, as both are formed from the same piece of material. The rejection of claim 1 over Tada should be withdrawn for this reason alone.

Furthermore, a third element of claim 1 comprises a nanoscale structure formed on the pillar. Tada does not disclose a nanoscale structure formed on the pillar. Tada teaches using nucleation sites (2) deposited on the substrate (1). The nucleation sites serve as the etching mask so that the pillars may be dry etched into the substrate. See Tada, Fig. 1(c). As a result of Tada's dry etching process, the nucleation site material (2) and the reaction products (4) formed during the dry etching process are left on top of the pillars (3) shaped from the substrate (1). The Office action does not clearly explain how Tada teaches nanoscale structures formed on the pillars. It states: "The silicon pillars have reaction products (4) and nucleation sites (2) thereon

which are considered nanoscale structures (see col. 6, lines 54-60).” The portion of Tada cited by the Office action to support this conclusion discusses the distribution of the diameters of the silicon pillars; it does not discuss nanoscale structures.

Regardless, no matter what the Office action meant to refer to in the above quotation, the materials disclosed by Tada are not nanoscale structures formed on the pillars as recited in claim 1. First, Tada’s nucleation site materials and reaction products are deposited on the substrate before the pillars are formed in Tada. See Tada Figs 1(a), 1(b), and 1(c) as well as column 2, lines 54-64. These materials, therefore, are not formed on the pillars as required by independent claim 1.

Further, the nucleation site material and reaction products of Tada are not nanoscale structures. The application provides representative examples of nanoscale structures “such as nanowires, nanotubes, nanocoils, or nanobelts.” See page 3, lines 23-24 of the application. The cited examples all have a structural component in addition to a size, i.e., nanoscale component. The materials in Tada are merely locally deposited materials which may be nanoscale. The nucleation sites and reaction products in Tada do not have a structural component, and thus are not the nanoscale structures recited by claim 1.

If the Office action meant to imply that the silicon pillars taught by Tada were the nanoscale structures recited by claim 1, this interpretation also does not meet the structural limitations of claim 1. Claim 1 recites three distinct structures: a substrate, a pillar formed on the substrate, and a nanoscale structure formed on the pillar. At best, Tada teaches only two of these features. Accordingly, for at least the foregoing reasons, claim 1 is not anticipated by Tada, and is in condition for allowance.

Claims 3, 17, 18, 22 and 27 depend from claim 1, and therefore are allowable for the reasons stated concerning claim 1, and further in view of the independently patentable combination of features recited in each dependent claim.

For example, claim 3 further recites that the pillar comprises a semiconducting material. As discussed above, Tada does not teach a pillar, so Tada cannot teach a pillar comprising a semiconducting material as recited by claim 3. Therefore, Tada does not teach all of the limitations of claim 3.

Claim 17 further recites that the substrate includes at least one of a metal, ceramic, plastic, or semiconductor. Tada teaches specific substrate materials, but not plastic substrates.

Claim 18 further recites that the substrate includes at least one of silicon, silicon nitride, quartz, and mica. Tada does not teach a substrate including quartz or mica.

Claim 22 further recites plural pillars arranged on the substrate in a selected pattern and plural nanoscale structures formed on the pillars. Again, Tada does not teach any pillars as recited by claim 1. Thus, Tada cannot teach a plurality of pillars formed on the substrate, as recited in claim 22.

Finally, claim 27 further recites pillars having a width of from about 10 nm to about 1 μ m. Since Tada does not teach a pillar as recited by claim 1, Tada cannot teach a pillar having a width from about 10 nm to about 1 μ m.

III. Rejection of Claims 1-4, 6-8 and 17-19 Over Schlaf

Claims 1-4, 6-8 and 17-19 are rejected under 35 U.S.C. § 102(a) as allegedly being anticipated by U.S. Patent No. 6,871,528 to Schlaf *et al.* (Schlaf). Applicants traverse this rejection and request that it be withdrawn.

Schlaf's earliest priority date is April 12, 2002. The subject matter of claims 1-4, 6-8 and 17-19 was invented well prior to this date. Therefore, the subject matter of claims 1-4, 6-8 and 17-19 was invented prior to the effective date of Schlaf, and thus Schlaf does not qualify as prior art. Please see the attached declaration under 37 C.F.R. § 1.131. Since Schlaf does not qualify as prior art, it cannot be used in a 35 U.S.C. 102(a) rejection, and thus claims 1-4, 6-8 and 17-19 are in condition for allowance.

IV. Rejection of Claims 1-6, 8, 17-19, 22, 26 and 27 Over Dai

Claims 1-6, 8, 17-19, 22, 26 and 27 are rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by U.S. Patent No. 6,346,189 to Dai *et al.* (Dai). Applicants traverse this rejection and request that it be withdrawn.

Claim 1 recites a composite comprising a substrate, a pillar formed on the substrate, the pillar further comprising a catalyst, and a nanoscale structure formed on the pillar. Dai does not teach or suggest all of the elements of claim 1. Dai discloses a substrate with catalyst islands formed on the substrate and carbon nanotubes formed on the catalyst islands. See abstract. Dai does not disclose the pillar recited by claim 1.

The pillar of applicants' claim 1 further comprises a catalyst, and thus the pillar and the catalyst are not integrated, and instead are two separate structures. The Office action contends that the catalyst islands of Dai meet the structural limitations of the pillar recited in claim 1. But, the catalyst islands of Dai cannot, at the same time, be both the pillar and the catalyst recited by claim 1. Thus, Dai does not teach a pillar, where the pillar further comprises a catalyst. Accordingly, for at least the foregoing reasons, independent claim 1 is not anticipated by Dai, and is in condition for allowance.

Claims 2-6, 8, 17-19, 22, 26 and 27 depend from claim 1, and therefore are allowable for the reasons stated for claim 1, and further in view of the independently patentable combination of features recited in each dependent claim.

For example, claim 3 further recites that the pillar comprises a semiconducting material. As discussed above, Dai does not teach a pillar as recited by claim 1, and therefore Dai cannot teach a pillar comprising a semiconducting material as recited by claim 3. Therefore, Dai does not teach all of the limitations of claim 3.

Claim 4 further recites that the pillar comprises a metal selected from the group consisting of W, Pt, Au, Al, Fe, Ni, Ti, Ta, Cu, and combinations thereof. Dai does not teach a pillar as recited by claim 1, and therefore Dai cannot teach a pillar comprising the specific metals recited by claim 4. Therefore, Dai does not teach all of the limitations of claim 4.

Claim 5 recites a pillar which is electrically connected to an electronic device. Dai does not teach a pillar as recited by claim 1, and therefore Dai cannot teach a pillar electrically connected to an electronic device as recited by claim 5. Thus, Dai does not teach all of the limitations of claim 5.

Claim 17 further recites that the substrate includes at least one of a metal, ceramic, plastic, or semiconductor. Dai teaches that the "substrate may be made of silicon, alumina, quartz, silicon oxide, or silicon nitride." See Dai col. 2, lines 33-34. Dai does not teach a plastic substrate.

Claim 18 further recites that the substrate includes at least one of silicon, silicon nitride, quartz, and mica. Dai teaches that the "substrate may be made of silicon, alumina, quartz, silicon oxide, or silicon nitride." See Dai col. 2, lines 33-34. Dai does not teach a mica substrate.

Claim 19 further recites a nanoscale structure comprising at least one of carbon, zinc oxide, cadmium sulfide, and silicon dioxide. Dai only discloses carbon nanotubes. See Dai

column 2, lines 26-32. Dai does not teach nanoscale structures comprising zinc oxide, cadmium sulfide, or silicon dioxide.

V. Rejection of Claims 15-16 Over Schlaf or Dai in view of Mancevski

Claims 15 and 16 are rejected under 35 U.S.C. § 103(a) as allegedly being obvious from Schlaf or Dai in view of U.S. Patent No. 6,146,227 to Mancevski (Mancevski). Applicants traverse this rejection and request that it be withdrawn.

To establish a *prima facie* case of obviousness, the references must teach or suggest all of the claim limitations. MPEP § 2142. Here, the combined references do not teach or suggest all of the claim limitations. Claims 15 and 16 ultimately depend from claim 1, and thus comprise a substrate, a pillar formed on the substrate, where the pillar further comprises a catalyst, and a nanoscale structure formed on the pillar. Claim 15 further specifies that the nanoscale structure is a carbon nanotube with a diameter between about 1 and 200 nm, and claim 16 further specifies a carbon nanotube with a diameter between about 1 and 100 nm. The Office action contends that Mancevski teaches a diameter for carbon nanotubes and, when combined with Dai or Schlaf, allegedly renders claims 15 and 16 obvious.

As discussed above, Schlaf does not qualify as prior art. Thus Schlaf cannot be combined with Mancevski to reject applicants' claims for obviousness.

Further, the combination of Dai and Mancevski does not render claims 15 or 16 obvious. As discussed above, Dai does not disclose pillars. Thus, the combination of Dai and Mancevski does not teach or suggest all of the limitations in either claim 15 or 16.

Accordingly, for at least the foregoing reasons, the composites of claims 15 and 16 are not obvious over Dai or Schlaf in view Mancevski, and are in condition for allowance.

VI. Rejection of Claims 20 and 21 Over Schlaf, Dai, or Tada in view of Li

Claims 20 and 21 are rejected under 35 U.S.C. § 103(a) as allegedly being obvious from Schlaf, Dai, or Tada in view of U.S. Patent No. 6,831,017 to Li *et al.* (Li). Applicants traverse this rejection and request that it be withdrawn.

Li's filing date was April 5, 2002, and this is the earliest date Li can be established as prior art. The subject matter of claims 20 and 21 was invented prior thereto. Please see the attached declaration and exhibits under 37 C.F.R. § 1.131. Since Li does not qualify as prior art,

it cannot be used in a 35 U.S.C. § 103(a) rejection, and thus claims 20 and 21 are in condition for allowance.

VII. Rejection of Claims 1, 9-10, 14, 22-26 and 28-29 Over Dai in view of Akiyama

Claims 1, 9-10, 14, 22-26 and 28-29 are rejected under 35 U.S.C. § 103(a) as allegedly being obvious from Dai in view of U.S. Patent No. 6,914,372 to Akiyama *et al.* (Akiyama). Applicants traverse this rejection and request that it be withdrawn.

To establish a *prima facie* case of obviousness, the references must teach or suggest all of the claim limitations. MPEP § 2142. Here, the combined references do not teach or suggest all of the claim limitations. Claim 1 recites a composite, comprising a substrate, a pillar formed on the substrate, where the pillar further comprises a catalyst, and a nanoscale structure formed on the pillar. Claims 9-10, 14, 22-26 and 28-29 ultimately depend from claim 1, and thus include all of the structural features of claim 1. The Office action contends that Akiyama teaches the use of nanoscale structures as emitters for display devices, and when combined with Dai, allegedly renders claims 1, 9-10, 14, 22-26 and 28-29 obvious.

The combination of Dai and Li does not render claims 1, 9-10, 14, 22-26 or 28-29 obvious. As discussed above, claim 1 and all of its dependent claims require a pillar. Dai does not disclose a pillar as recited by claim 1. Thus, the combination of Dai and Akiyama does not teach or suggest all of the limitations in claims 1, 9-10, 14, 22-26 or 28-29.

Accordingly, for at least the foregoing reasons, the composites as set out in claims 1, 9-10, 14, 22-26 and 28-29 are not rendered obvious by Dai in view Akiyama, and are in condition for allowance.

VIII. Rejection of Claims 11 and 12 Over Dai in view of Brown

Claims 11 and 12 are rejected under 35 U.S.C. § 103(a) as allegedly being obvious from Dai in view of U.S. Patent No. 6,297,063 to Brown *et al.* (Brown). Applicants traverse this rejection and request that it be withdrawn because a *prima facie* case of obviousness has not been established.

To establish a *prima facie* case of obviousness, the references must teach or suggest all of the claim limitations. MPEP § 2142. Here, the combined references do not teach or suggest all of the claim limitations. Claims 11 and 12 depend from claim 1 and thus comprise a substrate, a

pillar formed on the substrate, where the pillar further comprises a catalyst, and a nanoscale structure formed on the pillar. The Office action contends that Brown teaches a nanotube used as a transistor with at least two terminals and, when combined with Dai, allegedly renders claims 11 and 12 obvious. However, the combination of Dai and Brown does not render claims 11 or 12 obvious. As discussed above, Dai does not disclose pillars, and therefore does not teach all of the features of claim 1 or its dependent claims. Thus, the combination of Dai and Brown does not teach or suggest all of the features of claims 11 or 12.

Accordingly, for at least the foregoing reasons, the composites as set out in claims 11 and 12 are not rendered obvious by Dai in view Brown, and are in condition for allowance.

IX. New Claims 49-54


New claims 49-54 are novel and nonobvious over the prior art. Claims 49-54 all require pillars. The cited prior art references as presently understood do not teach pillars.

X. Conclusion

The present application is in condition for allowance and such action is respectfully requested. If any further issues remain concerning this application, the Examiner is requested to call the undersigned to discuss such matters.

Respectfully submitted,

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